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the illustrations are far superior to any in the author's earlier volumes. It is unfortunate, however, that a good book must be marred by so many illustrations without any natural scale. *Globigerinas* seemingly larger than a *laccolith* are at least an anomaly.

Each chapter in the book is followed by a series of review suggestions (useless to any but the worst teacher) and by a brief and well-selected list of reference books. It is a pleasure to see the usually unnecessary topics of minerals and rocks relegated to an appendix which need not be used by every teacher. The appendix also includes suggestions to teachers in reference to many topics, usually sources of difficulty. The most valuable chapter, however, is that devoted to laboratory equipment. This chapter contains detailed suggestions as to the choice of maps, as to the manner of keeping equipment, and as to the use of maps. It should be of great help to teachers who have before them the difficult task of persuading School Boards that laboratory work is necessary and an adequate equipment indispensable.

The book as a whole is interesting, usable, and attractive. It should take its place among the four or five best books in the field, and be of service in helping to improve secondary school geography. It distances by a good margin any previous volume by the author.

R. E. D.

*Round Kangchenjunga. A Narrative of Mountain Travel and Exploration by Douglas W. Freshfield. London, Edward Arnold, 1903. Large 8vo, pages xii, 373; 41 half-tone illustrations, 1 panorama, 3 maps, and appendices.*

Mr. Freshfield's book is a fine example of how mountaineering becomes ancillary to geographical science. It presents with vividness of detail the topography, glacial and scenic features, and, incidentally, the geology, of a limited area, in a region that appeals to our imagination as the culmination of mountain grandeur.

His expedition left Darjiling on September 5, 1899, and returned some weeks later, having "ascended and descended 75,000 feet, or 14 vertical miles up, and as many down." In the remoter districts they "had been 24 days without meeting any human beings, and 20 days without seeing a tree." Among the seven Europeans of the party there were, beside the leader, Professor Edmund Garwood, the Signori V. and E. Sella, and A. Maquignaz, an Italian guide—names familiar to Alpinists.

Yet, despite this notable aggregate of vertical miles, the expe-

dition did not prove the success that seemed guaranteed by the expert ability of the party. Nature seemed not yet prepared to admit man to those inviolate sanctuaries, for a storm of extraordinary severity, that spread ruin and death through the foothill country (27 inches of rainfall at Darjiling in 38 hours!) swept over the range on the evening of their arrival at a high camp (15,200 feet), near the northern base of Kangchenjunga. Snow a metre in depth surrounded them, and the snow-line was lowered 4,000 feet, rendering all climbing of high peaks impossible for that season.

A change of programme was imperative. Even the hoped-for crossing of the range, and into Nepal by an untried pass (20,000 feet), immediately north of the great peak, had to be abandoned, and the passage of the Jonsong La, of about the same altitude, but several miles farther north, had to be substituted for it. This pass had probably been made in 1884, by the native surveyor (pundit) Rinsing, who was also a member of the present party. This less exciting journey was, however, under existing conditions, no easy matter; nor would it lack results for geographic science. The native eye lacks observance for many things that interest the trained European. Rinsing's failure to recognize the pass when reached somewhat beclouds his title to having made it rather than some lower one, and only inadequate data existed for the region lying between the head of the great Zemu glacier, northeast of Kangchenjunga and the Kangbachen valley, west of the range visited by Sir Joseph D. Hooker in 1849. That lacuna is now filled.

Mr. Freshfield does not magnify the mountaineering difficulties of this high tour; indeed, he says, "there were no difficulties at all from the point of view of an Alpine guide or climber." Five camps were made on the ice or the moraine after their start; but, despite the heavy going, it seems clear that the time could have been practically halved with Swiss porters. It is again the familiar story of the inadequacy and undiscipline of coolies, mitigated only by evidences of unusual solicitude for their comfort and safety. While in general optimistic as regards the final conquest of even the tallest Himalayan giant, Mr. Freshfield believes that such victories are likely to be postponed until a more reliable way of transporting supplies to high camps can be reached. The book cannot but prove fascinating even to those not bitten with the love of mountain-climbing. The almost magical transition from the tropical forest of the Teesta valley to dazzling solitudes never before beheld by human eye, through zones of altitude that parallel a journey from Equator to Arctic Circle, gives ample scope to the author's

power as a word-painter. Certain passages are eloquent, as when he stands before queenly Siniolchum, "the most superb triumph of mountain architecture." It should be read with Sella's wonderful telephotograph before one, for no human words can reproduce it. Happily, the party had in its number the prince of photographers, whose reproductions of mountain majesties have been the delight of our generation, and the matter proved superb for his art. The results profusely illustrate the work. Probably the most wonderful product of the camera in high altitude is the panorama of the Kangchenjunga group from Kangchen glacier, at an elevation of 17,000 feet, reproduced from five consecutive negatives, with slight reduction.

The elaborate "sketch-map" in three colours on a scale of 1:125,000, prepared by Mr. Garwood, is a beautiful piece of work. Studied especially in connection with the numerous views, it gives most satisfactory information as to the topography of the Kangchenjunga range and its vast system of glaciers. These cover, approximately, 327 square miles, as against 193 for the Bernese Oberland.

A most interesting contrast is drawn by Mr. Freshfield between the surface conditions of Himalayan and Swiss glaciers. Here, instead of crevasses, at least in the trunk glaciers, one finds an "irregular labyrinth of heights and hollows." Crevasses they hardly met with, though they saw them in plenty on some of the secondary glaciers passed on either hand. There were no *moulins*; the drainage of the glacier seemed to be carried along its surface. Perhaps the most interesting phenomenon is one that suggests the *nieves penitentes* of the high Andes, recently discussed in the *Zeitschrift des deutschen und österreichischen Alpenvereins, Band xxxiii*. Where in the Alps there would have been an icefall, here they "were confronted by a multitude of ice pinnacles, best compared to the earth pillars found where friable slopes are subjected to severe atmospheric denudation. Tier above tier against the mountain side rose the frozen cones and spurs, a ghostly crowd illuminated by the sun's rays." The author accounts for these unusual conditions by the greater variations of the temperature to which the ice is here exposed," to fiercer sun heat, and, below a certain level, to heavier rainfall, which renders it more plastic than in the Alps.

Added testimony is furnished to prove "mountain sickness" a purely 'personal matter, as much so as seasickness. Those who suffered from it were most affected at 15,000-16,000 feet, with no increase of symptoms on rising to 20,000 feet. Mr. Dover, one

of the party, "had a constitution on which the only effect of altitude of 20,000 feet was to increase his appetite, and consequently his weight." A Gurkha pioneer (of whom they had six, beside some fifty coolies) ran uphill at the Jonsong La itself. Mr. Freshfield was able to walk at the end of the tour "from 13,000 to 16,000 feet without a halt." Naturally, he reprehends the aspersions on Mr. Graham's veracity or competence as to his reaching the summit of Kabru (24,000 feet), called in question principally by his having reported no evil effects of rarity of the air. So far as this bugbear is concerned, Mr. Freshfield does not hesitate to prophesy that Kangchenjunga and its loftier rivals will one day have a flag on their summits.

In one extended appendix Professor Garwood discusses the geological structure and physical features of Sikhim, accompanied by a map representing material for a geological map of the country and covering a somewhat larger area than the one already mentioned. Other interesting appendices are the narratives of the pundits Sarat Chandra Das and Rinsing, describing their respective crossings of the central range—the former into Tibet in 1879, the latter, as alleged, over the Jonsong La in 1884. In yet another Mr. Freshfield discusses the name of the world's highest measured peak, expressing his well-known objection to the name "Mt. Everest," to which he prefers "Gaurisankar," or, better yet, "Chomokankar"—a Tibetan name for this particular summit of the Gaurisankar group.

C. E. F.

*Elements of Geology, by Joseph Le Conte, revised and partly rewritten by Herman LeRoy Fairchild, Professor of Geology in the University of Rochester. Fifth edition. D. Appleton and Co., 1903.*

The appearance of Le Conte's portrait opposite the title-page reminds the reader that the venerable geologist has passed away. Geology is a growing science, and, excellent as the manual was, revision was needed to keep it abreast of present needs. Professor Fairchild has done this work well, but keeping of design, so far as might be, the form and spirit of the original. Even the paging of the sub-topics will usually be found the same—a limitation to the reviser's work which must have been embarrassing at times.

Very many of the illustrations of the earlier editions were antiquated, and a large body of new material has been introduced—a process which might in some cases have profitably been carried further. One is quite willing to see Newberry's curious drawing of the Colorado Cañon, with its deceptions, disappear from the